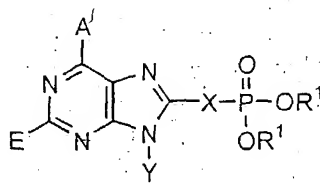


ABSTRACT

Novel purine compounds of the following structure and their use as fructose-1,6-bisphosphatase inhibitors is described.



wherein

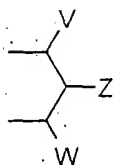
A is selected from the group consisting of  $-NR^8$ ,  $NHSO_2R^3$ ,  $-OR^5$ ,  $-SR^5$ , halogen, lower alkyl,  $-CON(R^4)_2$ , guanidine, amidine,  $-H$ , and perhaloalkyl;

E is selected from the group consisting of  $-H$ , halogen, lower alkylthio, lower perhaloalkyl, lower alkyl, lower alkenyl, lower alkynyl, lower alkoxy,  $-CN$ , and  $-NR^7$ ;

X is selected from the group consisting of alkylamino, alkyl, alkenyl, alkynyl, alkyl(carboxyl), alkyl(hydroxy), alkyl(phosphonate), alkyl(sulfonate), aryl, alkylaminoalkyl, alkoxyalkyl, alkylthioalkyl, alkylthio, alicyclic, 1,1-dihaloalkyl, carbonylalkyl, aminocarbonylamino, alkylaminocarbonyl, alkylcarbonylamino, aralkyl, and alkylaryl, all optionally substituted; or together with Y forms a cyclic group including cyclic alkyl, heterocyclic, and aryl;

Y is selected from the group consisting of  $-H$ , alkyl, alkenyl, alkynyl, aryl, alicyclic, aralkyl, aryloxyalkyl, alkoxyalkyl,  $-C(O)R^3$ ,  $-S(O)_2R^3$ ,  $-C(O)-OR^3$ ,  $-CONHR^3$ ,  $-NR^2$ , and  $-OR^3$ , all except H are optionally substituted; or together with X forms a cyclic group including aryl, cyclic alkyl, and heterocyclic;

$R^1$  is independently selected from the group consisting of  $-H$ , alkyl, aryl, alicyclic where the cyclic moiety contains a carbonate or thiocarbonate,  $-C(R^2)_2$ -aryl, alkylaryl,  $-C(R^2)_2OC(O)NR^2$ ,  $-NR^2-C(O)-R^3$ ,  $-C(R^2)_2-OC(O)R^3$ ,  $C(R^2)_2-O-C(O)OR^3$ ,  $-C(R^2)_2OC(O)SR^3$ , alkyl-S-C(O) $R^3$ , alkyl-S-S-alkylhydroxy, and alkyl-S-S-S-alkylhydroxy, or together  $R^1$  and  $R^1$  are -alkyl-S-S-alkyl to form a cyclic group, or together  $R^1$  and  $R^1$  are



wherein

V and W are independently selected from the group consisting of hydrogen, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, 1-alkynyl, and  $-R^9$ ; or

together V and Z are connected to form a cyclic group containing 3-5 atoms, optionally 1 heteroatom, substituted with hydroxy, acyloxy, alkoxycarboxy, or aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus; or

together V and W are connected to form a cyclic group containing 3 carbon atoms substituted with hydroxy, acyloxy, alkoxycarboxy, alkylthiocarboxy, hydroxymethyl, and aryloxy-carboxy attached to a carbon atom that is three atoms from an oxygen attached to the phosphorus;

Z is selected from the group consisting of  $-\text{CH}_2\text{OH}$ ,  $-\text{CH}_2\text{OCOR}^3$ ,  $-\text{CH}_2\text{OC(O)SR}^3$ ,  $-\text{CH}_2\text{OCO}_2\text{R}^3$ ,  $-\text{SR}^3$ ,  $-\text{S(O)R}^3$ ,  $-\text{CH}_2\text{N}_3$ ,  $-\text{CH}_2\text{NR}^2_2$ ,  $-\text{CH}_2\text{Ar}$ ,  $-\text{CH(Ar)OH}$ ,  $-\text{CH}(\text{CH}=\text{CR}^2_2)\text{OH}$ ,  $-\text{CH}(\text{C}\equiv\text{CR}^2_2)\text{OH}$ , and  $-\text{R}^2$ ;

with the provisos that:

a) V, Z, W are not all -H; and

b) when Z is  $-\text{R}^2$ , then at least one of V and W is not -H or  $-\text{R}^9$ ;

$\text{R}^2$  is selected from the group consisting of  $\text{R}^3$  and -H;

$\text{R}^3$  is selected from the group consisting of alkyl, aryl, alicyclic, and aralkyl;

$\text{R}^4$  is independently selected from the group consisting of -H, lower alkyl, lower alicyclic, lower aralkyl, and lower aryl;

$\text{R}^5$  is selected from the group consisting of lower alkyl, lower aryl, lower aralkyl, and lower alicyclic;

$\text{R}^6$  is independently selected from the group consisting of -H, and lower alkyl;

$\text{R}^7$  is independently selected from the group consisting of -H, lower alkyl, lower alicyclic, lower aralkyl, lower aryl, and  $-\text{C(O)R}^{10}$ ;

$R^8$  is independently selected from the group consisting of -H, lower alkyl, lower aralkyl, lower aryl, lower alicyclic,  $-C(O)R^{10}$ , or together they form a bidendate alkyl;

$R^9$  is selected from the group consisting of alkyl, aralkyl, and alicyclic;

$R^{10}$  is selected from the group consisting of -H, lower alkyl,  $-NH_2$ , lower aryl, and lower perhaloalkyl;

$R^{11}$  is selected from the group consisting of alkyl, aryl, -OH,  $-NH_2$  and  $-OR^3$ ; and pharmaceutically acceptable prodrugs and salts thereof.